



Great Lakes Environmental Research Laboratory

Stewards of the Great Lakes



The Great Lakes constitute one fifth of the world's surface fresh water supply and 95 percent of U.S. quantities.

Intelligent care of these resources is vital to the Nation's sustained economic and environmental well-being.



Declining Lake Michigan water levels to near-record lows during 1999-2000 have led to widening beaches, while at the same time creating costly problems for commercial shipping, recreational boating and marinas.



Storm-driven high waves and currents in Great Lakes coastal areas pose threats to life and property and require science-based measures to reduce the risk and damage of such hazards.

What does the Great Lakes Environmental Research Laboratory do for the nation?

Great Lakes Environmental Research Laboratory (GLERL) science helps protect life and property, economic well-being, and sustain the ecosystem health of the Great Lakes and other U.S. coastal ecosystems. GLERL provides coastal constituents and Federal, State and international decision and policy makers with scientific understanding of the sources, pathways, fates, and effects of toxicants; natural hazards such as severe waves, storm surges, and ice; ecosystems and their interactions, including the threat and impact of invasive species (e.g. zebra mussels); changes in water levels of the Great Lakes; and regional effects related to global climate change.

GLERL carries out research and provides scientific products, expertise, and services required for effective management and protection of Great Lakes and coastal ecosystems. Key scientific activities include:

- Explaining and predicting changes in water resources, lake water levels, and ice cover.
- Tracking the spread of invasive (exotic) species and determining their impact on Great Lakes and coastal ecosystem health.
- Identifying sources, pathways, and fate of toxic contaminants and nutrients as they are cycled through food webs in aquatic ecosystems.
- Examining the potential impact of climate and global change on Great Lakes water quantity and quality.
- Investigating nearshore hydrodynamic processes affecting protection of health, life, property and environmental quality.

Recent Accomplishments:

- Determined if the interaction of zebra mussels with nutrients in mussel-infested areas of the Great Lakes is linked with development of blue-green algal blooms in those areas. ***Payoffs: Understanding the cause of blue-green blooms will help managers develop effective strategies to address the problem of blooms of algae that cause taste and odor problems to water supplies.***
- Developed improved water-level statistics that reflect: (1) existing hydrologic and hydraulic conditions; (2) the longer-term response of the lakes to weather; (3) changes in climatic; and (4) the diverse needs of Great Lakes decision-makers. ***Payoffs: Assessing changes in the Great Lakes seasonal water level cycles will improve both our understanding of environmental processes and our predictive capabilities, leading to improved water resource management decisions.***

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- Determined the importance of episodic events, e.g. storms, runoff-events, downwelling, upwelling, lake ice cover, and thermal bar formation, to the structure and function of nearshore Lake Michigan ecosystems. ***Payoffs: Incorporation of the effects of episodic events into ecosystem models will improve predication of, and management response to, both anthropogenic and natural perturbations to ecosystem structure and function.***

What's Next for GLERL?

Scientific Challenges in the next five to 10 years:

- Expand and improve scientific knowledge of aquatic ecosystems, and processes within the Great Lakes and marine coastal environments.
- Develop new tools, approaches, and concepts for improved modeling, predictions and management of issues within the Great Lakes and coastal environments.
- Provide services and expert information to the scientific, regulatory and coastal-user communities.
- Provide the general public with information and services to enhance public awareness, understanding and safety.
- Lead and coordinate multi-institutional scientific program development throughout the Great Lakes and coastal aquatic environments.

Research Partnerships:

The Cooperative Institute for Limnology and Ecosystems Research (CILER) is NOAA's only Joint/Cooperative Institute dedicated to freshwater research. Established in 1989, CILER promotes collaborative research between GLERL, the University of Michigan, Michigan State University and other academic institutions throughout the Great Lakes Basin.

The Cooperative Institute for Climate and Ocean Research (CICOR), established in 1999 works with the NOAA laboratories and the Woods Hole Oceanographic Institution. CICOR research focuses on coastal ocean and nearshore processes, the ocean's role in climate and climatic variability, and marine ecosystem processes. GLERL is the host NOAA institution.

Additionally, through partnerships, GLERL conducts collaborative research with a wide array of research institutions at the state, regional, national and international levels.

Budget and Staff:

GLERL is an \$8.5 million laboratory (\$6.5 million of NOAA base) located in Ann Arbor, Michigan, with a field station in Muskegon, Michigan. GLERL has 81 employees, including 59 federal and 22 university.



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